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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution
Higher Education
"NORTH CAUCASUS FEDERAL UNIVERSITY"

APPROVED BY
Acting Director of the Institute
Advanced Engineering
Cand. Tech. Sci., Associate Professor
A.A. Porokhnya.

FUND OF ASSESSMENT TOOLS
for current monitoring of progress and intermediate certification
by discipline

Mathematical Modeling

Field of study	11.03.02 Infocommunication Technologies and Communication Systems
Profile	Intelligent Data Processing in Infocommunication Systems and Networks
Year of start of training	2026
Form of study	Full-time
Implemented in a semester	4

Introduction

1. Purpose: FAT is designed to objectively assess the level of competence formation.
2. FOS is an appendix to the program of the discipline "Mathematical Modeling".
3. Developer V.P. Mochalov, Professor of the Department of Digital, Robotic Systems and Electronics of the Institute of Advanced Engineering.
4. An examination of the FAT was carried out.
Members of the expert group:
Chairman: N.Y. Bratchenko, Associate Professor of the Department of Digital, Robotic Systems and Electronics of the Institute of Advanced Engineering.
Members of the Commission:
S.V. Yakovlev, Associate Professor of the Department of Digital, Robotic Systems and Electronics of the Institute of Advanced Engineering.
S.V. Melnikov, Senior Researcher of the Interdisciplinary Training and Research Center for Agricultural Technologies, Associate Professor of the Department of Digital, Robotic Systems and Electronics of the Institute of Advanced Engineering.
Representative of the employer's organization:
Mironov V.A., General Director of Orintex LLC.

Expert opinion: The FAT for the discipline allows you to assess the level of competence formation.
Start approbation.
5. The validity period of the FAT shall be determined by the period of implementation of the educational programme.

1. Description of the criteria for assessing competence at various stages of their formation, description of assessment scales

Competency(s), indicator(s)	Levels of competence formation			
	The minimum level has not been reached (Unsatisfactory) 2 points	Minimum level (satisfactory) 3 points	Intermediate level (good) 4 points	High level (excellent) 5 points
Competency: OPK-1				
Learning outcomes in the discipline (module): <i>Indicator:</i> ID-1OPK-1 Uses regulatory and technical documentation in the field of information and communication technologies	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations
<i>Indicator:</i> ID-2OPK-1 defines the general principles of functioning of hardware, software and hardware supported by PKIKS	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations
ID-3OPK-1 Defines the architectures of hardware, software and hardware supported by PKIKS	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations
Competency: OPK-2				

ID-1OPK-2 Uses Installation Instructions supported PCICS software	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations
ID-2OPK-2 Defines and analyzes the infrastructure of the PCICS network functions virtualization system	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations
ID-3OPK-2 Uses standards in the field of telecommunications for software-defined networks and virtualization of network functions	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations

Assessment tools TO CHECK THE LEVEL OF COMPETENCE FORMATION

Job Number	Correct answer	Content of the question	Competence	Time to complete the task
	c)	Number of stages of problem formulation in the linear programming method: a) 5; b) 4; c) 3.	OPK-1	5 min
	c)	What is the analysis of the stability of the optimal plan? a) Analysis of the application; (b) Definition of indicators; (c) Study of permissible characteristics.	OPK-1	5 min
	d)	The Concept of Duality in Linear Programming.	OPK-1	2 min
	a)	A distinctive feature of the cloud platform provided by Amazon. a) is a means of providing application integration services that provide transparent addressing and accessibility; c) ensures that the static IP address is linked to the user account. At the same time, in case of errors and failures in the operation of individual virtual machines, the IP address is automatically reassigned to another virtual machine; (c) Provides developers with practical An infinite number of queues. Each authorized application can register in a queue and send, receive, or delete messages. d) it is a service that provides an alert about changing the status of the subscription.	OPK-1	2 min
	b)		OPK-1	2 min
	d)		OPK-1	2 min
	a)	When is it preferable to use static routing instead of dynamic routing protocols? a) on a network where dynamic updates can pose a security risk (b) In a network that is planned to be expanded c) in a network with a large number of backup routes (d) In a network where communication failures occur frequently	OPK-1	2 min

	To combine workstations, you must use a switch. The cable type is straight. Workstations must be assigned IP addressing. You can conduct network activity using the ping utility.	Create a simple network design of two to three workstations and simulate network activity.	OPK-1	7 minutes
	To configure extended access lists, you must create a named access list: ip access-list extended Test Example of a TCP traffic denial rule: deny tcp 192.168.1.0 0.0.0.255 any Example of allowing traffic for telnet: permit tcp host 192.168.1.2 any eq telnet The permissive rule must be higher than the prohibitive one.	Build a network topology using 2 routers, 4 switches, and at least 8 workstations. Configure advanced access lists on the router. For any 2 subnets, deny TCP traffic with all hosts, but allow 1 computer to exchange it on each of these subnets for a telnet connection.	OPK-2	15 minutes
	b)	Which route will have the shortest administrative distance? a) Direct-Connected Network b) Static route c) Route received via EIGRP routing protocol d) Route received via the OSPF routing protocol	OPK-2	2 min
	d)	What type of address does the switch use to create the MAC address table? a) Destination IP address b) Source IP address c) Destination MAC address d) Source MAC address	OPK-2	2 min
	d)	Name the function of a Layer 2 switch. (a) Data transmission based on logical addressing. b) Duplicate the electrical signal of each frame to each port. c) Remembering the port assigned to the host by checking the destination MAC address. d) Determine the interface used to forward frames based on the destination MAC address.	OPK-2	2 min

	c)	The network of a small publisher is designed in such a way that 200 devices receive a broadcast message sent over the local network. How can a network administrator reduce the number of devices that receive broadcast traffic? a) Add switches so that fewer devices are connected to each individual switch. b) Replace the switches with others with a larger number of ports. In this way, more devices will be connected to a single switch. c) Divide the local network into smaller networks and configure routing between them. d) Replace at least half of the switches with hubs to reduce the size of the broadcast domain.	OPK-2	2 min
	a)	Which network device can be used as a boundary to split a Layer 2 broadcast domain? a) Router b) Ethernet bridge c) Ethernet hub (d) Access point	OPK-2	2 min
	a)	What is the essence of direct methods for minimizing the function of several variables? a) minimization according to the correct list; c) minimization according to the wrong list; (c) Approximate minimization.	OPK-2	2 min
	a)	How many basic procedures does the Hook-Jeeves algorithm contain? (a) Contains two main procedures; c) the algorithm contains three main procedures; c) <i>The algorithm contains four main procedures</i>	OPK-2	2 min
	c)	Features of the linear programming model. a) contains a target function; c) contains the objective function and boundary conditions;	OPK-4	3 min

		c) contains the objective function, the system of constraints and boundary conditions.		
	Determine the maximum number of addresses in the source network, it is 256. Find the number of addresses in the new subnet and round down to the power of two, it is $256/9=28.4$, after rounding 16. Mask for 16 addresses: /28 or 255.255.255.240	The 192.168.1.0/24 network must be divided into 9 subnets. In this case, it is necessary to connect as many hosts as possible to each segment. Which subnet mask should I choose?	OPK-2	10 min

2. Description of the rating scale

Within the framework of the rating system, students' progress in each discipline is assessed during current control and intermediate certification. The rating system for assessing students' knowledge is based on the use of a set of control measures to check the material covered (control points), optimally located throughout the time interval of studying the discipline. The principles of the rating system for assessing students' knowledge are based on the requirements described in the Regulation on the organization of the educational process based on the rating system for assessing students' knowledge at NCFU.

3. Criteria for assessing competencies

An "excellent" grade is given to a student if he/she fully and accurately performs the tasks of assessment tools in the discipline related to this competence (indicators of competence achievement), while demonstrating at a high level the ability to solve standard and non-standard applied practical problems of the physical foundations of telecommunications.

A grade of "good" is given to a student if he/she, making minor mistakes, performs the tasks of assessment tools in the discipline related to this competence (indicators of competence achievement), while demonstrating at an average level the ability to solve only standard applied practical problems of the physical foundations of telecommunications.

A "satisfactory" grade is given to a student if he/she performs the tasks of assessment tools in the discipline related to this competence (indicators of competence achievement), while demonstrating at a minimum level the ability to solve standard applied practical problems of the physical foundations of telecommunications.

An "unsatisfactory" grade is given to a student if he/she, performing the tasks of assessment tools in the discipline, does not reach the minimum level of competence formation ((indicators of competence achievement), while not demonstrating the ability to solve standard applied practical problems of the physical foundations of telecommunications, makes gross mistakes that he cannot correct even with the help of leading questions from the teacher.